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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/923,834	08/07/2001	Robert F. Darveaux	M-10966 US	1262

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EXAMINER

ERDEM, FAZLI

ART UNIT	PAPER NUMBER
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2826

DATE MAILED: 09/12/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/923,834

Applicant(s)

DARVEAUX ET AL.

Examiner

Fazli Erdem

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04 June 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☐ Claim(s) _____ is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-6,9-16,18-34,36,38-41,43,44,46 and 47 is/are rejected.
- 7) ☒ Claim(s) 7,8,17,35,37,42 and 45 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Allowable Subject Matter

1. Claims 7, 8, 17, 35, 37, 42 and 45 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-5, 9-16, 18, 19, 26, 30, 31, 32, 34, 36, 38, 39 and 41 rejected under 35 U.S.C. 103(a) as being unpatentable over Wang et al. (5,977,616) in view of Khan et al. (US 2002/0109226).

Regarding Claims 1-5, 9-16, 18, 19, 26, 30, 31, 32, 34, 36, 38 and 41, Wang et al. disclose a thermally and electrically enhanced PBGA package which includes a substrate having a die adhere on it. The die and the substrate are interconnected by means of signal transferring means. Solder bumps are formed on the bottom side surface of the substrate. Molding compound is encapsulated among the substrate, the die and a heat spreader. A heat spreader is arranged over the top surface of the substrate. The heat spreader includes a plane having four supporting members that are set on the bottom side of the plane and at the corners of the plane. The supporting members are protruded from the plane to connect the heat spreaders and the

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substrate. The heat spreader further includes a protruded portion. A further supporting member is formed on the central portion of the protruded portion. The substrate has a die paddle formed for receiving die. A power ring is formed around the die paddle on the surface of the substrate for power unit. A ground ring formed around the power ring on the substrate has ground pads. The supporting members of the heat spreader are connected on the ground pads by using the heat spreader attach material. Wang et al. fail to disclose the required encapsulation structure that completely covers the heat slug and the die. However, Khan et al. disclose an enhanced die-down ball grid array and method for making the same where the required encapsulation structure is disclosed.

It would have been obvious to one of having ordinary skill in the art at the time the invention was made to include the required encapsulation structure in Wang et al. as taught by Khan et al. in order to have a semiconductor packaging structure with better reliability.

3. Claim 6 rejected under 35 U.S.C. 103(a) as being unpatentable over Wang et al. in view of Hawthorne et al. (6,008,991) further in view of Khan et al. (US 2002/0109226).

Regarding Claim 6, Wang et al. disclose all the claimed subject matter, except the thermally conducting adhesive. However, Hawthorne et al. disclose an electronic system including packaged integrated circuits with heat spreading standoff support members where the thermally conducting adhesive is shown. Wang et al. and Hawthorne et al. fail to disclose the required encapsulation structure that completely covers the heat slug and the die. However, Khan et al. disclose an enhanced die-down ball grid array and method for making the same where the required encapsulation structure is disclosed.

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It would have been obvious to one of having ordinary skill in the art at the time the invention was made to include the required encapsulation structure in Wang et al. and Hawthorne et al. combination as taught by Khan et al. in order to have a semiconductor packaging structure with better reliability.

4. Claims 20-23, 43, 44, 46 and 47 rejected under 35 U.S.C. 103(a) as being unpatentable over Wang et al. in view of Bernier et al. (6,069,023) further in view of Khan et al. (US 2002/0109226).

Regarding Claims 20-23, 43, 44, 46 and 47, Wang et al. disclose all the claimed subject matter in device form. Wang et al. fail to show the method of making such device. However, Bernier et al. disclose heat sinks and method of attaching heat sinks directly to flip chips and ceramic chip carriers. Wang et al. and Bernier et al. fail to disclose the required encapsulation structure that completely covers the heat slug and the die. However, Khan et al. disclose an enhanced die-down ball grid array and method for making the same where the required encapsulation structure is disclosed.

It would have been obvious to one of having ordinary skill in the art at the time the invention was made to include the required encapsulation structure in Wang et al. and Bernier et al. combination as taught by Khan et al. in order to make a semiconductor packaging structure with better reliability.

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5. Claims 24, 25, 27, 28 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang et al. in view of Huang et al. (6,400,014) further in view of Khan et al. (US 2002/0109226).

Regarding Claims 24,25,27, 28, and 29, Wang et al. disclose all the claimed subject matter except it fails to show the heat spreader having contact with the substrate. However, Huang et al. disclose a semiconductor package with a heat sink where the heat sink is in contact with the substrate. Wang et al. and Huang et al. fail to disclose the required encapsulation structure that completely covers the heat slug and the die. However, Khan et al. disclose an enhanced die-down ball grid array and method for making the same where the required encapsulation structure is disclosed.

It would have been obvious to one of having ordinary skill in the art at the time the invention was made to include the required encapsulation structure in Wang et al. and Huang et al. combination as taught by Khan et al. in order to have a semiconductor packaging structure with better reliability.

6. Claim 33 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wang et al. in view of Kajihara (5,616,957) further in view of Khan et al. (US 2002/0109226).

Regarding Claims 24,25,27, 28, and 29, Wang et al. disclose all the claimed subject matter except it fails to show the heat spreader not having contact with the substrate. However, Kajihara discloses a semiconductor package with a heat sink where the heat sink is not in contact with the substrate. Wang et al. and Kajihara et al. fail to disclose the required encapsulation structure that completely covers the heat slug and the die. However, Khan et al. disclose an

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enhanced die-down ball grid array and method for making the same where the required encapsulation structure is disclosed.

It would have been obvious to one of having ordinary skill in the art at the time the invention was made to include the required encapsulation structure in Wang et al. and Kajihara et al. combination as taught by Khan et al. in order to have a semiconductor packaging structure with better reliability.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Fazli Erdem whose telephone number is (703) 305-3868. The examiner can normally be reached on M - F 8:00 - 5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan Flynn can be reached on (703) 308-6601. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

FE
August 23, 2003


Minhloan Tran
Primary Examiner
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